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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte PER H. HAMMARLUND and STEPHAN J. JOURDAN

Appeal 2009-005596
Application 10/749,271[1]
Technology Center 2100

Decided: June 16, 2010

Before JOHN A. JEFFERY, JEAN R. HOMERE, and JAMES R. HUGHES, *Administrative Patent Judges*.

HUGHES, *Administrative Patent Judge*.

DECISION ON APPEAL

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[1] Application filed December 30, 2003. The real party in interest is Intel Corporation. (Br. 2.)

STATEMENT OF THE CASE

Appellants appeal from the Examiner's rejection of claims 1-30 under authority of 35 U.S.C. § 134(a). The Board of Patent Appeals and Interferences (BPAI) has jurisdiction under 35 U.S.C. § 6(b).

We affirm.

Appellants' Invention

Appellants invented an adaptive replay system that replays computer processing instructions that are not properly executed when initially dispatched to an execution unit. (Spec. ¶ [0018].) The adaptive replay system or loop efficiently allows the instructions to be executed again by allowing instructions to change position in the replay loop, decreasing instruction execution. (Spec. ¶ [0022].)

The system includes an execution unit, a staging unit that forwards an instruction through a replay loop operating in parallel to the execution unit, a selector (MUX), coupled to the staging unit, that places the instruction in an optimal position within the replay loop, and a scoreboard, coupled to the selector, that stores status information for the instruction. (Spec. ¶¶ [0029], [0030], [0037]-[0039].)[2]

[2] We refer to Appellants' Specification ("Spec."); Appeal Brief (Response to Non-Compliant Appeal Brief) ("App. Br.") filed May 28, 2008; and Reply Brief ("Reply Br.") filed October 6, 2008. We also refer to the Examiner's Answer ("Ans.") mailed August 4, 2008.

Representative Claim

Independent claim 1 further illustrates the invention. It reads as follows:

> 1. An adaptive replay system comprising:
>
> a staging unit to forward an instruction in a replay loop parallel to an execution unit;
>
> a selector device coupled to said staging area to place said instruction in an optimal position within said replay loop; and
>
> a scoreboard coupled to said selector device to store status information for said instruction.

References

The Examiner relies on the following references as evidence of unpatentability:

Merchant	US 6,163,838	Dec. 19, 2000
Merchant	US 6,385,715 B1	May 7, 2002
Topham	US 6,944,853 B2	Sep. 13, 2005 (filed May 22, 2001)

Rejections on Appeal

The Examiner rejects claims 1, 2, 4, and 7 under 35 U.S.C. § 102(b) as anticipated by Merchant (US 6,385,715 B1 ("Merchant")).

The Examiner rejects claims 3, 9-15, 18-23, 25-27, 29, and 30 under 35 U.S.C. § 103(a) as being unpatentable over Merchant.

The Examiner rejects claims 5, 6, 16, and 17 under 35 U.S.C. § 103(a) as being unpatentable over Merchant and Merchant (US 6,163,838 ("Merchant '838")).

The Examiner rejects claims 8, 24, and 28 under 35 U.S.C. § 103(a) as being unpatentable over Merchant and Topham.

Grouping of the Claims

Appellants argue independent claim 1 as representative of claims 1, 2, 4, and 7 (rejected under § 102(b)). (App. Br. 7.) Appellants do not separately argue the remaining claim groups: Group (1) – claims 3, 9-15, 18-23, 25-27, 29, and 30 rejected under § 103(a) over Merchant (App. Br. 8); Group (2) – claims 5, 6, 16, and 17 under § 103(a) over Merchant and Merchant '838 (App. Br. 8); and Group (3) – claims 8, 24, and 28 under § 103(a) over Merchant and Topham (App. Br. 9). Rather, Appellants reiterate their arguments made with respect to independent claim 1 and the § 102(b) rejection. (Br. 8-9.) We accept Appellants' grouping of the claims, and choose independent claim 1 as representative of Appellants' arguments and groupings. Accordingly, we treat Appellants' claims 2-30 as standing or falling with representative claim 1. *See* 37 C.F.R. § 41.37(c)(1)(vii) (2007).

ISSUE

Based on our review of the administrative record, Appellants' contentions, and the findings and conclusions of the Examiner, the pivotal issue before us is as follows:

Did the Examiner err in finding the Merchant reference discloses, and would have taught or suggested to a skilled artisan, an adaptive replay system including a selector device coupled to a staging unit to place an instruction in an optimal position within a replay loop?

FINDINGS OF FACT (FF)

Appellants' Specification

1. Appellants do not explicitly define in their Specification a "selector device," or an "optimal position" of an instruction in a replay loop. Appellants explain that:

> When an instruction needs to be replayed, adaptive replay selector MUX 425 can utilize the information stored in scoreboard 430 to check if the instruction is at the optimal position in the replay loop. Based on the information, adaptive replay MUX 425 can change the instruction's relative position in the replay loop.

(Spec. ¶ [0039].) Appellants provide examples of such an "optimal position," for example, where "a Uop that is scheduled late as compared to the Uop it depends on is allowed to move ahead within replay stages 420 closer to the Uop it depends on" (Spec. ¶ [0039]) – *see* Appellants' Specification ¶ [0042], and Figures 5a & 5b.

Merchant Reference

2. Merchant describes a multi-threading processor and a multi-stage replay system including a checker and a multiple replay queues for "replaying" (re-executing) instructions that did not execute properly in the first instance. (Abstract; col. 1, ll. 19-21; col. 1, l. 65 to col. 2, l. 6.)

3. Merchant's replay system includes two staging sections (staging queues A, B, C, & D, and staging queues E & F). Merchant's processor stages instructions in staging queues A, B, C, & D in parallel with an execution unit (element 118), and supplies the instructions to a checker (element 150) that determines if the instruction properly executed. If the

instruction does not execute properly, it is replayed. The instruction is routed through a replay loop (element 156) including a controller (element 154) that may send the instruction through staging queues E & F to a multiplexer (MUX, element 116) and then (again) through staging queues A, B, C, & D. Alternatively, the controller may send the instruction to a replay queue (element 170) that temporarily stores the instruction before sending it to the MUX. (Col. 5, ll. 16-30; col. 6, ll. 7-25, 39-49; Fig. 1.)

ANALYSIS

Rejection Under § 102(b)

Appellants contend the Merchant reference does not disclose the features of independent claim 1, specifically, "'an adaptive replay system comprising:*... a selector device* coupled to said staging area *to place said instruction in an optimal position within said replay loop...*' (e.g., as described in claim 1)." (App. Br. 5.) The Examiner finds that the Merchant reference discloses each feature of Appellants' independent claim 1, and maintains that the claim is properly rejected as anticipated by Merchant. (Ans. 3-4, 14-16.) Specifically, the Examiner finds that Merchant's checker (150) and controller (154) meet the limitation of a selector device that places an instruction in an optimal position in the replay loop. (Ans. 3-4, 15-16.) Accordingly, we decide the question of whether the Examiner erred in finding the Merchant reference discloses an adaptive replay system including a selector device coupled to a staging unit to place an instruction in an optimal position within a replay loop.

After reviewing the record on appeal, we agree with the Examiner's findings with respect to the Merchant reference, and we find that Merchant

discloses the disputed feature of Appellants' claim 1. We begin our analysis by construing Appellants' claim.

We determine the scope of the claims in patent applications not solely based on the claim language, but upon giving claims "their broadest reasonable interpretation consistent with the [S]pecification" and "in light of the [S]pecification as it would be interpreted by one of ordinary skill in the art." *In re Am. Acad. of Sci. Tech Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004) (citations omitted).

Appellants do not explicitly define a "selector device" or an "optimal position" in their Specification. (FF 1.) Appellants also do not provide any limitations to the structure of the "selector device" in their claim. Rather, Appellants define their "selector device" by the claim language in terms of its function – placing ("to place") "said instruction in an optimal position within said replay loop." (Br. 11, Claim App'x, claim 1.) Thus, we broadly but reasonably construe Appellants' "selector device" to simply be a module capable of selecting instructions.

Appellants explain in their Specification that the selector device repositions the instruction within the replay loop based on information input to the selector device so that the instruction executes more efficiently (quickly). (FF 1.) Appellants provide examples of "optimal" repositioning, but do not explicitly describe the criteria utilized to determine the "optimal position," or the process (or algorithm) utilized by the selector device to reposition the instruction. (FF 1.) Thus, we broadly but reasonably construe placing the instruction in an "optimal position" in the replay loop – utilizing undisclosed and unclaimed criteria, and undisclosed and unclaimed processes or mechanisms – to simply mean repositioning an instruction to a

position within the replay loop that is subjectively determined to be more efficient (optimal). Accordingly, we construe Appellants' disputed limitation to mean a module for selecting an instruction and repositioning the instruction to a position within the replay loop that is more efficient.

We find that Merchant discloses a replay system including two separate staging sections. The first staging section (staging queues A, B, C, & D) supplies instructions to a checker (150) that determines if the instructions have properly executed. If not, the checker routes the instruction(s) through a replay loop including a controller (154), so that the instruction is re-executed. The controller may route the instruction through a second staging section (staging queues E & F) or through a replay queue (170) that temporarily stores the instruction. In either case, the instruction is then routed to MUX (116) and then sent through the first staging section again. (FF 2, 3.)

Thus, we find Merchant discloses a replay system including a checker, a controller, two separate staging sections, and a replay queue. We construe Appellants' recited "replay loop" to (broadly but reasonably) include Merchant's second staging section (staging queues E & F) and replay queue. We further find, as did the Examiner (*see* Ans. 15-16), that Merchant's checker and controller route instructions through the second staging section or through the replay queue, and therefore reposition the instructions within the replay loop. Thus, we find Merchant discloses a module for selecting instructions and repositioning them within the replay loop so that the instructions execute more efficiently – i.e., repositioning the instructions to an optimal position within the replay loop.

We are not persuaded by Appellants' argument that the reference does not disclose the disputed limitation because "making a conditional determination upon which one of two steps may be followed is not the same as placing an instruction in an optimal position *within a replay queue* (as described in embodiments of the present application) at all." (App. Br. 6.) As we explained *supra*, Merchant discloses a selector (checker and controller) that selects instructions and routes them through staging queues or a replay queue. Routing an instruction through the staging queues, or alternatively the replay queue, results in repositioning of the instruction in the replay loop – the instruction will, depending on its path, reach the MUX at different times. These different routes result in the instructions executing more efficiently (see Ans. 15-16). Appellants' recited claim limitation does not preclude utilizing alternate paths/loops within a replay loop, and Appellants' do not explain how Merchant fails to disclose the recited functionality – i.e., how "making a conditional determination" to route an instruction along alternate paths "is not the same as placing an instruction in an optimal position."

We note that a prior art reference that achieves the same result in the same manner anticipates a disputed limitation. *See Continental Can Co. v. Monsanto Co.*, 948 F.2d 1264, 1268-1269 (Fed. Cir. 1991) ("If, however, the disclosure is sufficient to show that the natural result flowing from the operation as taught would result in the performance of the questioned function, it seems to be well settled that the disclosure should be regarded as sufficient."); *Tate Eng'g, Inc. v. United States*, 477 F.2d 1336, 1342, (Ct. Cl. 1973) ("To anticipate, a prior art reference must disclose each and every element of a claimed invention, or its equivalents, and the element must

function in substantially the same way to produce substantially the same result."). With regard to Appellants' use of the terms "place," "optimal position," and "replay loop," we are guided by *In re Bond*, 910 F.2d 831, 832-33 (Fed. Cir. 1990); and *In re May*, 574 F.2d 1082, 1090 (CCPA 1978) (*citing In re Schaumann*, 572 F.2d 312, 317 (CCPA 1978) ("A reference does not fail as an anticipation merely because it does not contain a description of the subject matter of the appealed claim in ipsissimis verbis."). Merchant may anticipate Appellants' claim 1 even if it does not use identical terminology. Thus, Appellants have not persuaded us to find error in the Examiner's anticipation rejection of claims 1, 2, 4, and 7. Therefore, we affirm the Examiner's rejection of these claims.

Rejections Under § 103(a)

As we explained supra, Appellants simply reiterate the same arguments with respect to the Examiner's obviousness rejections, as set forth in response to the anticipation rejection of independent claim 1. Specifically, Appellants argue that Merchant does not teach placing an instruction in an optimal position within a replay loop, and that the Merchant '838 and Topham references do not cure the deficiencies of Merchant – *see* (1) rejection of claims 3, 9-15, 18-23, 25-27, 29, and 30 (in view of Merchant) (App. Br. 8); (2) rejection of claims 5, 6, 16, and 17 (in view of Merchant and Merchant '838) (App. Br. 8); and (3) rejection of claims 8, 24, and 28 (in view of Merchant and Topham) (App. Br. 9). We have already addressed these arguments and found them to be unpersuasive in our discussion of independent claim 1. Thus, Appellants have not persuaded us

to find error in the Examiner's obviousness rejection of claims 3, 5, 6, and 8-30.

CONCLUSIONS OF LAW

On the record before us, we find the Examiner did not err in finding the Merchant reference discloses, and would have taught or suggested to a skilled artisan, "[a]n adaptive replay system" including "a selector device coupled to [a staging unit] to place [an] instruction in an optimal position within [a] replay loop" (as recited in Appellants' claim 1). Thus, on the record before us, we find the Examiner did not err in rejecting claims 1, 2, 4, and 7 under 35 U.S.C. § 102(b), and claims 3, 5, 6, and 8-30 under 35 U.S.C. § 103(a).

DECISION

We affirm the Examiner's rejection of claims 1, 2, 4, and 7 under 35 U.S.C. § 102(b).

We affirm the Examiner's rejections of claims 3, 5, 6, and 8-30 under 35 U.S.C. § 103(a).

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

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